

*Radionuclide Concentrations in Honey Bees
from Area G at TA-54 during 1999*

Los Alamos
NATIONAL LABORATORY

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Prepared by Teresa Hiteman, Group ESH-20*

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Issued: June 2000

*Radionuclide Concentrations in Honey Bees
from Area G at TA-54 during 1999*

T.K. Haarmann

P.R. Fresquez

RADIONUCLIDE CONCENTRATIONS IN HONEY BEES FROM AREA G AT TA-54 DURING 1999

T.K. Haarmann and P.R. Fresquez

ABSTRACT

Honey bees were collected from two colonies located at Los Alamos National Laboratory's Area G, Technical Area 54, and from one control (background) colony located near Jemez Springs, NM. Samples were analyzed for various radionuclides. Area G sample results from both colonies were higher than the upper (95%) level background concentration for ^3H . Sample results from one colony were higher than the upper (95%) level background concentration for total uranium, while sample results from the other colony were higher than the upper (95%) level background concentration for ^{90}Sr .

INTRODUCTION

As part of the ongoing environmental surveillance program at Area G (Fresquez *et al.* 1997a)—a 25.5-ha (63-ac) low-level radioactive waste management and disposal area located on the east end of Mesa del Buey at Technical Area 54 at Los Alamos National Laboratory (LANL) (Figure 1)—samples of honey bees were collected from beehives during the fall of 1999. Honey bees can be thought of as mobile samplers that efficiently cover

a large sample area and then return to a central location (Bromenshenk 1992). Honey bees forage in an area with a radius as large as 6 km (3.7 mi) and often cover a total area up to 100 square km (39 square mi) (Leita *et al.* 1996, Visscher and Seeley 1982). Each hive contains literally thousands of bees that will forage for nectar, water, pollen, and plant resins, which are all brought back into the hive. During these foraging flights, bees inadvertently contact and accumulate a wide array of pollutants,

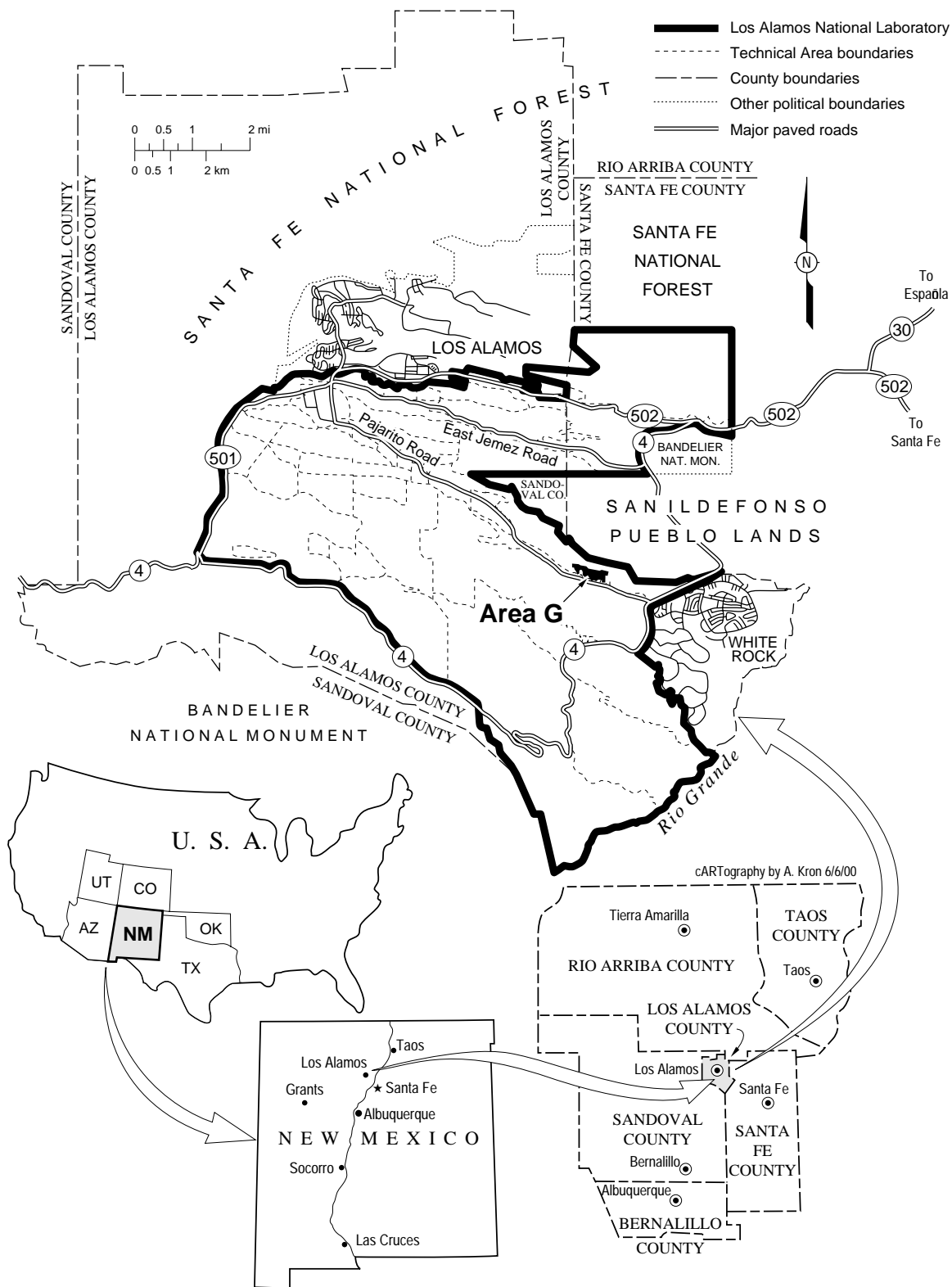


Figure 1. The location of Area G at Los Alamos National Laboratory.

some of which are brought back to the colony (Bromenshenk *et al.* 1985). These contaminants often become incorporated into the bee tissue, the wax, the honey, or the hive itself (Wallwork-Barber *et al.* 1982).

Honey bee studies have been conducted on many different types of pollutants including fluoride (Bromenshenk *et al.* 1988a, Mayer *et al.* 1988), lead (Migula *et al.* 1989), zinc (Bromenshenk *et al.* 1988b), nickel (Balestra *et al.* 1992), potassium (Barbattini *et al.* 1991), cesium (Bettoli *et al.* 1987, Tonelli *et al.* 1990), tritium (White *et al.* 1983, Fresquez *et al.* 1997b), and plutonium (Hakonson and Bostick 1976). Honey bee sampling is an inexpensive form of monitoring, especially considering the many different sampling points the foraging bees visit. Collection of bees at one location (the hive) can provide a plethora of information from numerous points concerning the distribution and bioavailability of contaminants. Comparing the amounts of contaminants in honey bees with the known amounts of contaminants in the surrounding area could be useful for modeling the

redistribution of contaminants through ecosystems. The very nature of honey bee ecology makes them an excellent living system from which to monitor the presence of contaminants.

The objective of this study was to compare various radionuclide concentrations in honey bees from Area G with honey bees collected from a background location.

METHODS

We monitored Area G using beehives consisting of a standard Langstroth hive stocked with Italian honey bees (*Apis mellifera ligustica*). During 1997, two colonies were established on the south end of Area G near the ^3H shafts (Figure 2). These colonies were brought into the study site from an uncontaminated area. In addition, a control (background) site with one colony was established 10 km (6 mi) south of Jemez Springs, NM.

In the early fall of 1999, bee tissue samples were collected from all of the colonies. Three separate samples (one from each colony), each containing approximately 100 g of bees, were collected. Each individual 100-g sample

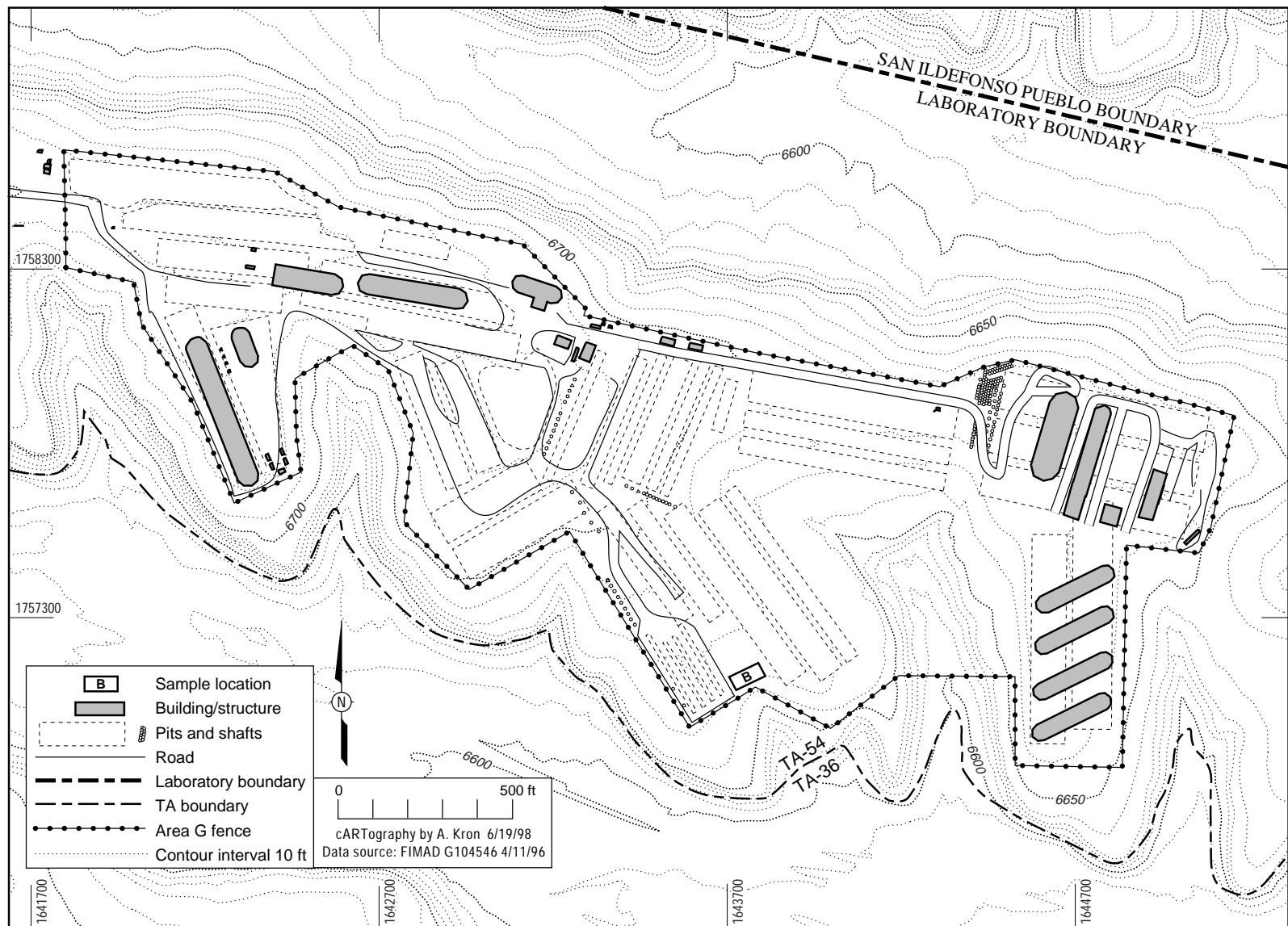


Figure 2. Site/sample location of bee hives at Area G.

consisted of approximately 1,000 bees. Bee samples were collected using a small, rechargeable vacuum. Bees were vacuumed off frames that were removed from the honey supers, transferred to a plastic resealable bag, weighed, and double bagged into plastic resealable bags. All samples were kept in a cooler and frozen upon returning to the laboratory. With each sample collected, the vacuum collection area was thoroughly cleaned to avoid cross-contamination of samples.

All samples were analyzed by LANL's Environmental Chemistry Group for ^3H , ^{137}Cs , ^{241}Am , ^{238}Pu , $^{239,240}\text{Pu}$, ^{90}Sr , and total uranium. Analytical methods have been previously described in Fresquez *et al.* (1997c). The bee ^3H samples were analyzed by liquid scintillation counting in the following manner: 5 ml of moisture were distilled from each sample, mixed with 15 ml of a scintillation solution, and counted on a scintillation counter for 50 minutes. The gamma-emitting radionuclide concentrations were determined using high-resolution germanium detector gamma-ray spectrometry. However, for

a more accurate analysis of ^{241}Am , alpha spectrometry was used. Am and Pu samples were dissolved in nitric acid, isolated by anion exchange, electroplated onto stainless steel disks, and counted using an alpha spectrometer. Total uranium was determined by kinetic phosphorescence analysis.

RESULTS

Table 1 contains a summary of the 1999 analytical results from samples collected near Area G and the control site. The original analytical reports are included in the Appendix for future reference. For the purpose of this report, only concentrations that were at detectable levels—where the analytical result was higher than two times the counting uncertainty—are discussed in further detail.

In general, most radionuclides, with the exception of ^3H , ^{90}Sr , and total uranium, were within the regional statistical reference level (RSRL). The RSRL is the upper (95%) level background concentration (mean + two std dev) derived from the combined 1997, 1998, and 1999 control data

(Haarmann 1997; Haarmann and Fresquez 1998, 1999). Similar to our results from 1997 and 1998, the largest concentration difference between Area G and the RSRL was seen in the ^3H levels. Tritium levels in the Area G bees, for example, were at 146.9 and 122.0 pCi mL⁻¹; the control colony contained -0.10 pCi mL⁻¹, with a RSRL of 5.47 pCi mL⁻¹.

Concentrations of ^{90}Sr were higher in one Area G colony than the RSRL. Additionally, concentrations of total uranium were higher than the RSRL in the other Area G colony.

ACKNOWLEDGMENT

Thanks to Rebecca J. Wechsler, for technical assistance at Area G.

Table 1. Radionuclide Analytical Results from Honey Bee Samples Collected from Colonies at Area G and a Control Site in 1999.

Element	Units	Area G		Area G		Control	AU	RSRL
		G-1	AU ^a	G-2	AU			
^{238}Pu	pCi/g ^b	-0.0160	0.0081	-0.0107	0.0122	-0.0063	0.0034	0.0063 ^c
$^{239,240}\text{Pu}$	pCi/g ^b	-0.0117	0.0106	0.0060	0.0128	-0.0014	0.0025	0.0222 ^c
total U	μg/g ^b	0.46	0.05	0.39	0.04	0.31	0.03	0.41 ^c
^{137}Cs	pCi/g ^b	-0.38	6.39	0.00	6.00	-1.01	3.98	0.101 ^c
^{241}Am	pCi/g ^b	-0.0048	0.0032	-0.0118	0.0134	-0.0064	0.0052	0.0304 ^c
^{90}Sr	pCi/g ^b	0.61	1.06	4.22	1.22	1.63	0.69	3.01 ^d
^3H	pCi/mL ^e	146.90	5.40	122.00	4.70	-0.10	0.61	5.47 ^c

^aAnalytical Uncertainty; values are the uncertainty in the analytical results at the 65% confidence level (one sigma).

^bUnits are in g per ash.

^cRegional Statistical Reference Level; the upper (95%) level background concentration (mean + two sigma) from 1997, 1998, and 1999 control data.

^dRegional Statistical Reference Level; the upper (95%) level background concentration (mean + two sigma) from present control data.

^eUnits are in mL tissue moisture.

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APPENDIX

CST ANALYTICAL REPORTS OF RADIONUCLIDES IN BEES

Los Alamos
NATIONAL LABORATORY
Memorandum

Chemical Science and Technology

Responsible Chemistry for America

CST-9/Analytical Chemistry Sciences
Los Alamos, New Mexico 87545

To/MS: Phil Fresquez ESH-20/M887

From/MS: Claudine Armenta/K484

Phone/FAX: 5-7358/5-5982

Symbol: CST-9/00

Date: March 28, 2000

This is a Case Narrative for the following:

Submission ID : 100040337
Analysis : Am analysis on Biological Samples

I. Introduction

On September 20, 1999 four biological samples were delivered to the CST-9 radiochemistry section for the requested analysis.

II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is: Americium-241 in Environmental Matrices, (Water, Air Filter & Biological Samples) - Alpha Spectroscopy. The specific procedure can be found either on line @ <http://cst.lanl.gov/docs>, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC 327-R.0.

III. Quality Control

The appropriate quality control samples were analyzed with the samples.

IV. Comments

Four samples were analyzed for Americium-241. These samples are spiked with Americium-243.

All Quality Control parameters are within appropriate limits and as such meet CST-9's quality assurance program objectives. This data was added to batch B-16-00Am with other submissions (100040524, 100040881 and 100040882). The Replicate information is with submission 100040882.

I verify, to the best of my knowledge that the listed results are both complete and technically correct, with the exception of the item(s) detailed above.


Claudine F. Armenta 3/28/00

005

28-Mar-2000 08:02

LOS ALAMOS NATIONAL LABORATORY
CST Analytical Chemistry
Analytical Results Report

Page 1 of 4

Method: AM RAS ENV

Method Area: EH-ALPHA

Submission Id : 100040337

Requester Name:	TIM HAARMANN	Customer Cost Code:	FT00C34A05FF400000	Due Date:	22-NOV-99
Requester Group:	ESH-20	Logged Date:	20-SEP-1999	Screening Data:	NO SCREENING DATA REQUIRED
Mail Stop:	M887	Study:	ESH20 BIOLOGICALS	Logged by:	APODACA
Requester Phone:	667-0815	Analytical Service Agreement #:			
Requester Fax #:	667-0731				

CUSTOMER SAMPLES

<u>Sample Id</u>	<u>Task Id</u>	<u>Customer Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>Qualifier</u>
200109136	300235206	G-1	Am-241	-0.0048	0.0032	pCi/g	
			Am-241 DL	0.0196		pCi/g	
			Am-243T Recovery	99.40		%	
			Analysis Date	12-MAR-2000		DD-MON-YYYY	
			Instrument	32 ALPHA		NONE	
			Problem Code	OK		NONE	
			Count Time	3000.00		min	
			Efficiency	31.62		%	
200109137	300235211	G-2	Am-241	-0.0118	0.0134	pCi/g	
			Am-241 DL	0.0114		pCi/g	
			Am-243T Recovery	101.78		%	
			Analysis Date	12-MAR-2000		DD-MON-YYYY	
			Instrument	32 ALPHA		NONE	
			Problem Code	OK		NONE	
			Count Time	3000.00		min	
			Efficiency	28.76		%	
200109138	300235216	C-1	Am-241	-0.0064	0.0052	pCi/g	
			Am-241 DL	0.0082		pCi/g	

**** FINAL REPORT ****

Method: AM RAS ENV

Method Area: EH-ALPHA

Submission Id : 100040337

<u>Sample Id</u>	<u>Task Id</u>	<u>Customer Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>Qualifier</u>
200109138	300235216	C-1	Am-243T Recovery	103.62		%	
			Analysis Date	12-MAR-2000		DD-MON-YYYY	
			Instrument	32 ALPHA		NONE	
			Problem Code	OK		NONE	
			Count Time	3000.00		min	
			Efficiency	29.76		%	

**** FINAL REPORT ****

007

28-Mar-2000 08:02

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Method: AM RAS ENV

Method Area: EH-ALPHA

Submission Id : 100040337

***** CST QUALITY ASSURANCE REPORT *****

BLIND QC

<u>Customer Id</u>	<u>Task Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>QC Value</u>	<u>QC Uncertainty</u>	<u>QC units</u>	<u>QC Evaluation</u>
200109140	300235219	Am-241	6.0252	0.1221	pCi/g	5.8	0.26	pCi/g	IN CONTROL

OPEN QC

<u>Customer Id</u>	<u>Task Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>QC Value</u>	<u>QC Uncertainty</u>	<u>QC units</u>	<u>QC Evaluation</u>
00.41404	300261403	Am-241	0.0025	0.0006	pCi/L	0.0023	0.00023	pCi/L	IN CONTROL

METHOD BLANK

<u>Customer Id</u>	<u>Task Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>QC Value</u>	<u>QC Uncertainty</u>	<u>QC units</u>	<u>QC Evaluation</u>
00.22784	300261402	Am-241	-0.0049	0.0044	pCi/g	0	0	pCi/g	IN CONTROL

**** FINAL REPORT ****

004


28-Mar-2000 08:02

Page 4 of 4

Method: AM RAS ENV

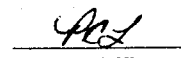
Method Area: EH-ALPHA

Submission Id : 100040337

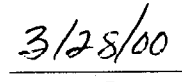

Analyst

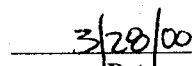

Review

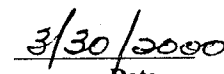

Team Leader


QA Officer


Date


Date


Date


Date

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

**** FINAL REPORT ****

Los Alamos
NATIONAL LABORATORY
Memorandum

Chemical Science and Technology

Responsible Chemistry for America

CST-9/Analytical Chemistry Sciences
Los Alamos, New Mexico 87545

To/MS: Tim Haarmann ESH-20/M887

From/MS: Claudine Armenta/K484

Phone/FAX: 5-7358/5-5982

Symbol: CST-9/00

Date: March 25, 2000

This is a Case Narrative for the following:

Submission ID : 100040337
Analysis : Pu analysis on Biological Samples

I. Introduction

On September 20, 1999 three biological samples were delivered to the CST-9 radiochemistry section for the requested analysis.

II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is: Actinides In Environmental Matrices, (Biological A& Filters) - Alpha Spectroscopy. The specific procedure can be found either on line @ <http://cst.lanl.gov/docs>, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC 372 R.O.

III. Quality Control

The appropriate quality control samples were analyzed with the samples.

IV. Comments

Three samples were analyzed for Plutonium-238 and Plutonium-239. These samples are spiked with Plutonium-242.

All Quality Control parameters are within appropriate limits and as such meet CST-9's quality assurance program objectives. This set was put into a batch with other submissions 100040524, 100040881 and 100040882 batch name is B-15-00Pu. The replicate information is with submission 100040882.

I verify, to the best of my knowledge that the listed results are both complete and technically correct, with the exception of the item(s) detailed above.


Claudine E. Armenta 3/25/00

005

25-Mar-2000 10:51

LOS ALAMOS NATIONAL LABORATORY
CST Analytical Chemistry
Analytical Results Report

Page 1 of 4

Method: PU RAS ENV

Method Area: EH-ALPHA

Submission Id : 100040337

Requester Name:	TIM HAARMANN	Customer Cost Code:	FT00C34A05FF400000	Due Date:	22-NOV-99
Requester Group:	ESH-20	Logged Date:	20-SEP-1999	Screening Data:	NO SCREENING DATA REQUIRED
Mail Stop:	M887	Study:	ESH20 BIOLOGICALS	Logged by:	APODACA
Requester Phone:	667-0815				
Requester Fax #:	667-0731	Analytical Service Agreement #:			

CUSTOMER SAMPLES

<u>Sample Id</u>	<u>Task Id</u>	<u>Customer Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>Qualifier</u>
200109136	300235203	G-1	Pu-238	-0.0160	0.0081	pCi/g	
			Pu-238 DL	0.0342		pCi/g	
			Pu-239	-0.0117	0.0106	pCi/g	
			Pu-239 DL	0.0442		pCi/g	
			Pu-242T Recovery	98.13		%	
			Analysis Date	20-MAR-2000		DD-MON-YYYY	
			Instrument	96 ALPHA		NONE	
			Problem Code	OK		NONE	
			Count Time	3000.00		min	
			Efficiency	24.48		%	
			Pu-238	-0.0107	0.0122	pCi/g	
			Pu-238 DL	0.0542		pCi/g	
			Pu-239	0.0060	0.0128	pCi/g	
200109137	300235208	G-2	Pu-239 DL	0.0509		pCi/g	
			Pu-242T Recovery	94.15		%	
			Analysis Date	20-MAR-2000		DD-MON-YYYY	
			Instrument	96 ALPHA		NONE	
			Problem Code	OK		NONE	

**** FINAL REPORT ****

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Method: PU RAS ENV

Method Area: EH-ALPHA

Submission Id : 100040337

<u>Sample Id</u>	<u>Task Id</u>	<u>Customer Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>Qualifier</u>
200109137	300235208	G-2	Count Time	3000.00		min	
			Efficiency	24.24		%	
200109138	300235213	C-1	Pu-238	-0.0063	0.0034	pCi/g	
			Pu-238 DL	0.0160		pCi/g	
			Pu-239	-0.0014	0.0025	pCi/g	
			Pu-239 DL	0.0082		pCi/g	
			Pu-242T Recovery	94.82		%	
			Analysis Date	20-MAR-2000		DD-MON-YYYY	
			Instrument	96 ALPHA		NONE	
			Problem Code	OK		NONE	
			Count Time	3000.00		min	
			Efficiency	26.51		%	

**** FINAL REPORT ****

007

25-Mar-2000 10:51

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Method: PU RAS ENV

Method Area: EH-ALPHA

Submission Id : 100040337

***** CST QUALITY ASSURANCE REPORT *****

BLIND QC

<u>Customer Id</u>	<u>Task Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>QC Value</u>	<u>QC Uncertainty</u>	<u>QC units</u>	<u>QC Evaluation</u>
200109140	300235218	Pu-238	7.7189	0.2531	pCi/g	7.4	0.26	pCi/g	IN CONTROL
		Pu-239	2.4370	0.0859	pCi/g	2.34	0.075	pCi/g	IN CONTROL

OPEN QC

<u>Customer Id</u>	<u>Task Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>QC Value</u>	<u>QC Uncertainty</u>	<u>QC units</u>	<u>QC Evaluation</u>
00.39798	300262903	Pu-238	4256	147	pCi/L	4180	418	pCi/L	IN CONTROL

METHOD BLANK

<u>Customer Id</u>	<u>Task Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>QC Value</u>	<u>QC Uncertainty</u>	<u>QC units</u>	<u>QC Evaluation</u>
00.22784	300262902	Pu-238	0.0027	0.0026	pCi/g	0	0	pCi/g	IN CONTROL
		Pu-239	-0.0056	0.0025	pCi/g	0	0	pCi/g	WARNING 2-3SIG

***** FINAL REPORT *****

Method: PU RAS ENV

Method Area: EH-ALPHA

Submission Id : 100040337

TEA
Analyst

BJ
Review

CB
Team Leader

RL
QA Officer

3/25/00
Date

3/27/00
Date

3/27/00
Date

3/28/2000
Date

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

**** FINAL REPORT ****

Los Alamos
NATIONAL LABORATORY
Memorandum
Chemical Science and Technology
Responsible Chemistry for America
CST-9/Analytical Chemistry and Science
Los Alamos, New Mexico 87545

To/MS: Files
From/MS: Edward Gonzales/ MS K484
Phone/FAX: 7-7094/5-5982
Symbol: CST-9/99
Date: April 13, 2000

This is a Case Narrative for the following:

Submission ID: 100040337

Analysis: Sr-90 in ash

I. Introduction

In September 1999, a set of samples was delivered to the CST-9 radiochemistry section for the requested analysis.

II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is: Strontium In Water – Liquid Scintillation Counting. The specific procedure can be found either on line @ <http://cst.lanl.gov/docs>, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC367, R.1.

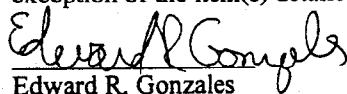
III. Quality Control

The appropriate quality control samples were analyzed with the samples.

IV. Comments

This case narrative was generated to document the circumstances that were involved with the development of this data package. All QA perimeters were in control. There are also no replicate analyses due to insufficient sample.

I verify, to the best of my knowledge that the listed results are both complete and technically correct, with the exception of the item(s) detailed above.


Edward R. Gonzales

LOS ALAMOS NATIONAL LABORATORY
CST Analytical Chemistry
Analytical Results Report

Method: SR-90 LS ENV Method Area: EH-ALPHA Submission Id : 100040337

Requester Name:	TIM HAARMANN	Customer Cost Code:	FT00C34A05FF400000	Due Date:	22-NOV-99
Requester Group:	ESH-20	Logged Date:	20-SEP-1999	Screening Data:	NO SCREENING DATA REQUIRED
Mail Stop:	M887	Study:	ESH20 BIOLOGICALS	Logged by:	APODACA
Requester Phone:	667-0815	Analytical Service Agreement #:			
Requester Fax #:	667-0731				

CUSTOMER SAMPLES

<u>Sample Id</u>	<u>Task Id</u>	<u>Customer Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>Qualifier</u>
200109136	300235205	G-1	Sr-90	0.61	1.06	pCi/g	
			Sr-90 MDA	2.38		pCi/g	
			Analysis Date	22-FEB-2000		DD-MON-YYYY	
			Comments	NA		NONE	
200109137	300235210	G-2	Sr-90	4.22	1.22	pCi/g	
			Sr-90 MDA	2.28		pCi/g	
			Analysis Date	22-FEB-2000		DD-MON-YYYY	
			Comments	NA		NONE	
200109138	300235215	C-1	Sr-90	1.63	0.69	pCi/g	
			Sr-90 MDA	1.38		pCi/g	
			Analysis Date	22-FEB-2000		DD-MON-YYYY	
			Comments	NA		NONE	

**** FINAL REPORT ****

Method: SR-90 LS ENV

Method Area: EH-ALPHA

Submission Id : 100040337

***** CST QUALITY ASSURANCE REPORT *****

BLIND QC

<u>Customer Id</u>	<u>Task Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>QC Value</u>	<u>QC Uncertainty</u>	<u>QC units</u>	<u>QC Evaluation</u>
200109144	300235220	Sr-90	2.53	0.61	pCi/g	1.83	0.058	pCi/g	IN CONTROL

OPEN QC

<u>Customer Id</u>	<u>Task Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>QC Value</u>	<u>QC Uncertainty</u>	<u>QC units</u>	<u>QC Evaluation</u>
00.36592	300265836	Sr-90	503.72	31.14	pCi/L	499.5	15.98	pCi/L	IN CONTROL

METHOD BLANK

<u>Customer Id</u>	<u>Task Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>QC Value</u>	<u>QC Uncertainty</u>	<u>QC units</u>	<u>QC Evaluation</u>
00.22784	300265835	Sr-90	-0.43	0.23	pCi/g	0	0	pCi/g	IN CONTROL

**** FINAL REPORT ****

Method: SR-90 LS ENV

Method Area: EH-ALPHA

Submission Id : 100040337

Cef
Analyst

FD
Review

TS
Team Leader

NK JPC
QA Officer

4-14-00
Date

4/14/00
Date

4/15/00
Date

4/14/00
Date

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

**** FINAL REPORT ****

Los Alamos
NATIONAL LABORATORY
Memorandum
Chemical Science and Technology
Responsible Chemistry for America
CST-9/Inorganic Trace Analysis
Los Alamos, New Mexico 87545

To/MS: Phil Fresquez / MS M887
From/MS: Anthony Sanchez/MSK484
Phone/FAX: 7-5998/5-5982
Symbol: CST-9/99
Date: October 14, 1999

This is a Case Narrative for the following:

Submission ID: 100040342
Analysis: Tritium Analysis in Water

I. Introduction

On September 20, 1999, a set of water samples was delivered to the CST-9 radiochemistry section for the requested analysis.

II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is Tritium in Environmental Matrices – Distillation and Liquid Scintillation Counting. The specific procedure can be found either on line @ <http://cst.lanl.gov/docs>, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC335, R.1.

III. Quality Control

The appropriate quality control samples were analyzed with the submitted samples.

IV. Comments

This case narrative was generated to document the circumstances that were involved with the development of this data package. This submission was batched with other submission's for QA and QC. I verify, to the best of my knowledge, that the listed results are both complete and technically correct.

 10/14/99
Anthony Sanchez

000004

LOS ALAMOS NATIONAL LABORATORY
CST Analytical Chemistry
Analytical Results Report

Method: H-3 LS ENV

Method Area: EH-ALPHA

Submission Id : 100040342

Requester Name:	PHIL FRESQUEZ	Customer Cost Code:	FT0000C34A05FF4000	Due Date:	22-OCT-99
Requester Group:	ESH-20	Logged Date:	20-SEP-1999	Screening Data:	NO SCREENING DATA REQUIRED
Mail Stop:	M887	Study:	ESH20 BIOLOGICALS	Logged by:	APODACA
Requester Phone:	667-0815				
Requester Fax #:	667-0731	Analytical Service Agreement #:			

CUSTOMER SAMPLES

<u>Sample Id</u>	<u>Task Id</u>	<u>Customer Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>Qualifier</u>
200109152	300235228	G-1	H-3	146900	5400	pCi/L	
			H-3 MDA	400		pCi/L	
200109153	300235229	G-2	H-3	122000	4700	pCi/L	
			H-3 MDA	400		pCi/L	
200109154	300235230	C-1	H-3	-100	610	pCi/L	
			H-3 MDA	440		pCi/L	

200000

**** FINAL REPORT ****

Method: H-3 LS ENV

Method Area: EH-ALPHA

Submission Id : 100040342

***** CST QUALITY ASSURANCE REPORT *****

BLIND QC

<u>Customer Id</u>	<u>Task Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>QC Value</u>	<u>QC Uncertainty</u>	<u>QC units</u>	<u>QC Evaluation</u>
200109155	300235231	H-3	14500	1400	pCi/L	16130	600	pCi/L	IN CONTROL

000006

**** FINAL REPORT ****

Method: H-3 LS ENV

Method Area: EH-ALPHA

Submission Id : 100040342

Ajp
Analyst

SLG
Review

SLG for GR
Team Leader

NK for PCL
QA Officer

10/14/99
Date

10/19/99
Date

10/19/99
Date

10/19/99
Date

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

**** FINAL REPORT ****

000007

Los Alamos
NATIONAL LABORATORY
Memorandum
Chemical Science and Technology
Responsible Chemistry for America
CST-9/Inorganic Trace Analysis
Los Alamos, New Mexico 87545

To/MS: Phil Fresquez/ MS M887
From/MS: S. R. Garcia/ MS K484
Phone/FAX: 5-0270/5-5982
Symbol: CST2000-PRF-5
Date: February 16, 2000

This is a Case Narrative for the following:

Submission ID : 1000400337
Analysis : CS-137 ASSAY OF ASHED BEES.

I. Introduction

On September 20, 1999 a set of ashed bee samples were delivered to the CST-9 radiochemistry section for the ¹³⁷Cs analysis.

II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is: Gamma-Ray-Emitting Nuclides in Environmental Matrices - Gamma Spectroscopy, an Instrumental Method. The specific procedure can be found on line @ <http://cst.lanl.gov/docs>, Method ANC328, R.0.

III. Quality Control

The appropriate quality control samples were analyzed with the samples.

IV. Comments

This case narrative was generated to document the circumstances that were involved with the development of this data package.

The ashed bee samples were picked up at Cage 7, Bldg. 1, TA-59.

All Laboratory Control Samples and blind QC are within CST-9's statistical acceptance criteria. No replicate samples were available for these samples.

This submission was batched with 100041459 for QA/QC purposes.

Please feel free to call or email me if you have any questions concerning this submission.

I verify, to the best of my knowledge, that the listed results are both complete and technically correct, with the exception of the item(s) detailed above.


Sammy R. Garcia
Email: garcia_s@lanl.gov

LOS ALAMOS NATIONAL LABORATORY
CST Analytical Chemistry
Analytical Results Report

Method: GENERIC GAMMA Method Area: EH-GAMMA Submission Id : 100040337

Requester Name:	PHIL FRESQUEZ	Customer Cost Code:	FT00C34A05FF400000	Due Date:	22-NOV-99
Requester Group:	ESH-20	Logged Date:	20-SEP-1999	Screening Data:	NO SCREENING DATA REQUIRED
Mail Stop:	M887	Study:	ESH20 BIOLOGICALS	Logged by:	APODACA
Requester Phone:	667-0815				
Requester Fax #:	667-0731	Analytical Service Agreement #:			

CUSTOMER SAMPLES

<u>Sample Id</u>	<u>Task Id</u>	<u>Customer Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>Qualifier</u>
200109136	300235207	G-1	CS-137	-0.38	6.39	pCi/g	
			CS-137 MDA	3.20		pCi/g	
200109137	300235212	G-2	CS-137	0.000	6.00	pCi/g	
			CS-137 MDA	3.00		pCi/g	
200109138	300235217	C-1	CS-137	-1.01	3.98	pCi/g	
			CS-137 MDA	1.99		pCi/g	

**** FINAL REPORT ****

Method: GENERIC GAMMA Method Area: EH-GAMMA Submission Id : 100040337

***** CST QUALITY ASSURANCE REPORT *****

BLIND QC

<u>Customer Id</u>	<u>Task Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>QC Value</u>	<u>QC Uncertainty</u>	<u>QC units</u>	<u>QC Evaluation</u>
200109145	300235221	CS-137	53.1	5.9	pCi/g	54.7	1.75	pCi/g	IN CONTROL

OPEN QC

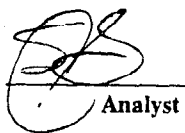
<u>Customer Id</u>	<u>Task Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>QC Value</u>	<u>QC Uncertainty</u>	<u>QC units</u>	<u>QC Evaluation</u>
00.33376	300256922	CS-137	4.94	0.55	pCi/g	5.0400	0.1700	pCi/g	IN CONTROL
00.33381	300256923	CS-137	4.37	0.57	pCi/g	4.8500	0.1600	pCi/g	IN CONTROL

METHOD BLANK

<u>Customer Id</u>	<u>Task Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>QC Value</u>	<u>QC Uncertainty</u>	<u>QC units</u>	<u>QC Evaluation</u>
00.22785	300256921	CS-137	0.000	0.131	pCi/g	0.0	0.0	pCi/g	IN CONTROL

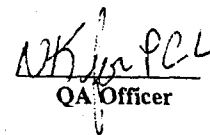
**** FINAL REPORT ****

Method: GENERIC GAMMA Method Area: EH-GAMMA Submission Id : 100040337


Analyst


Review


Team Leader


QA Officer

2/16/2000
Date

2/17/00
Date

2/18/00
Date

02/18/00
Date

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

**** FINAL REPORT ****

Los Alamos
NATIONAL LABORATORY
Memorandum
Chemical Science and Technology
Responsible Chemistry for America
CST-9/Analytical Chemistry Sciences
Los Alamos, New Mexico 87545

To/MS: ESH-20/M887
From/MS: Nancy Lujan/ MS K484
Phone/FAX: 5-6010/5-5982
Symbol: CST-9/00
Date: February 25, 2000

This is a Case Narrative for the following:

Submission ID : 100040337
Analysis : U (KPA) in Ashed Bees

I. Introduction

On September 20, 1999, a set of Ashed Bee samples was delivered to the CST-9 radiochemistry section for the requested analysis.

II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is: Uranium in Environmental Matrices – KPA. The specific procedure can be found either on line @ <http://cst.lanl.gov/docs>, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC337, R.0.

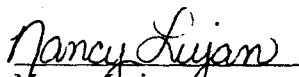
III. Quality Control

The appropriate quality control samples were analyzed with the samples.

IV. Comments

This case narrative was generated to document the circumstances that were involved with the development of this data package. As part of the process to inform our customers of potential problems associated with specific methods, the KPA method has been found to be unreliable in some matrices due to the strong susceptibility of interference's from constituents commonly found in environmental samples. Alternate techniques available for the analysis of U would be either ICP-MS or Isotopic Uranium analysis.

Samples were analyzed and reported. All Quality Control samples were In Control and reportable. I verify, to the best of my knowledge, that the listed results are both complete and technically correct.


Nancy Lujan

LOS ALAMOS NATIONAL LABORATORY
CST Analytical Chemistry
Analytical Results Report

Method: GENERIC KPA

Method Area: EH-ALPHA

Submission Id : 100040337

5017

Requester Name:	PHIL FRESQUEZ	Customer Cost Code:	FT00C34A05FF400000	Due Date:	22-NOV-99
Requester Group:	ESH-20	Logged Date:	20-SEP-1999	Screening Data:	NO SCREENING DATA REQUIRED
Mail Stop:	M887	Study:	ESH20 BIOLOGICALS	Logged by:	APODACA
Requester Phone:	667-0815	Analytical Service Agreement #:			
Requester Fax #:	667-0731				

CUSTOMER SAMPLES

<u>Sample Id</u>	<u>Task Id</u>	<u>Customer Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>Qualifier</u>
200109136	300235204	G-1	U	0.46	0.05	ug/g	
			Analysis Date	25-FEB-2000		DD-MON-YYYY	
200109137	300235209	G-2	U	0.39	0.04	ug/g	
			Analysis Date	25-FEB-2000		DD-MON-YYYY	
200109138	300235214	C-1	U	0.31	0.03	ug/g	
			Analysis Date	25-FEB-2000		DD-MON-YYYY	

DUPLICATE TASKS

<u>Sample Id</u>	<u>Task Id</u>	<u>Original Task</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>Qualifier</u>
200109136	300235204		U	0.46	0.05	ug/g	
			Analysis Date	25-FEB-2000		DD-MON-YYYY	
200123221	300258941	300235204	U	0.43	0.04	ug/g	
			Analysis Date	25-FEB-2000		DD-MON-YYYY	

**** FINAL REPORT ****

Method: GENERIC KPA

Method Area: EH-ALPHA

Submission Id : 100040337

60117

***** CST QUALITY ASSURANCE REPORT *****

BLIND QC

<u>Customer Id</u>	<u>Task Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>QC Value</u>	<u>QC Uncertainty</u>	<u>QC units</u>	<u>QC Evaluation</u>
200109146	300235222	U	0.38	0.04	ug/g	0.38	0.038	ug/g	IN CONTROL

OPEN QC

<u>Customer Id</u>	<u>Task Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>QC Value</u>	<u>QC Uncertainty</u>	<u>QC units</u>	<u>QC Evaluation</u>
00.38058	300258939	U	10.74	1.07	ug/L	10.1	1.0	ug/L	IN CONTROL

METHOD BLANK

<u>Customer Id</u>	<u>Task Id</u>	<u>Component</u>	<u>Result Value</u>	<u>Uncertainty</u>	<u>Units</u>	<u>QC Value</u>	<u>QC Uncertainty</u>	<u>QC units</u>	<u>QC Evaluation</u>
00.22776	300258940	U	0.00	0.01	ug/g	0	0	ug/g	IN CONTROL

**** FINAL REPORT ****

Method: GENERIC KPA

Method Area: EH-ALPHA

Submission Id : 100040337

ml
Analyst

CS
Review
for SC

CS
Team Leader

CS
QA Officer

2/25/00
Date

2/25/00
Date

2/25/00
Date

2/26/2000
Date

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

**** FINAL REPORT ****

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